

ODYSSEY Molecular Explorer

— Release 7.0 —

Correlation with the

Alaska Content and Performance Standards Grades 9-11

Revised March 2006

Concepts of Physical Science

Performance Standards / Grade Level Expectations

SB Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.

SB1 The student demonstrates an understanding of the structure and properties of matter by...

Grade 9:

- **SB1.1** ...describing atoms and their base components (i.e., protons, neutrons, electrons)

Grade 10:

- **SB1.1** ...using the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons)

Grade 11:

- **SB1.1** ...predicting the properties of an element (i.e., reactivity, metal, non-metal) using the periodic table and verifying the predictions through experimentation

→ **D2** *Atoms* "Distribution of Mass in Atoms"

→ **P1** *Main Groups & Transition Metals* "Alkali Metals"

→ **P2** *Main Groups & Transition Metals* "Alkaline Earth Metals"

→ **P3** *Main Groups & Transition Metals* "Boron Group"

→ **P4** *Main Groups & Transition Metals* "Carbon Group"

→ **P6** *Main Groups & Transition Metals* "Nitrogen Group"

→ **P7** *Main Groups & Transition Metals* "Oxygen Group"

→ **P10** *Main Groups & Transition Metals* "Halogens"

→ **P11** *Main Groups & Transition Metals* "Noble Gases"

→ **P12** *Main Groups & Transition Metals* "Elements of the d- and f-Blocks"

SB2 The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by...

Grade 9:

- **SB2.1** ...applying the concepts of heat transfer (i.e., conduction, convection, radiation) to Alaskan dwellings
- **SB2.2** ...recognizing simple electrical circuits

Grade 10:

- **SB2.1** ...examining energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy

Grade 11:

- **SB2.1** ...demonstrating energy (e.g., nuclear, electromagnetic, chemical, mechanical, thermal) transfers and transformations by comparing useful energy to total energy (entropy)

→ **L2** *Thermochemistry* "Thermal Energy"

→ **L6** *Thermochemistry* "Specific Heat"

→ **O3** *Chemical Thermodynamics* "Heat Conduction"

→ **O4** *Chemical Thermodynamics* "Entropy and the States of Matter"

SB3 The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by...

Grade 9:

- **SB3.1** ...recognizing that a chemical reaction has taken place
- **SB3.2** ...explaining that in chemical and nuclear reactions, energy (e.g., heat, light, mechanical, and electrical) is transferred into and out of a system
- **SB3.3** ...recognizing that atoms emit and absorb electromagnetic radiation

Grade 10:

- **SB3.1** ...describing the behavior of electrons in chemical bonding
- **SB3.2** ...recognizing that radioactivity is a result of the decay of unstable nuclei
- **SB3.3** ...comparing the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)

Grade 11:

- **SB3.1** ...predicting how an atom can interact with other atoms based on its electron configuration and verifying the results
- **SB3.2** ...researching applications of nuclear reactions in which a small amount of matter is converted directly into a huge amount of energy (i.e., $E=MC^2$)

- **F7** *Chemical Bonding* "Electron Sharing"
- **F8** *Chemical Bonding* "Energetics of Covalent Bonding"
- **F13** *Chemical Bonding* "Classifying by Bond Polarity"
- **M1** *Kinetics* "Observing a Reaction"
- **M2** *Kinetics* "Reactive Collisions"
- **M3** *Kinetics* "Mechanism of a Reaction"